

**TROPICAL RAINFALL MEASURING MISSION
PRECIPITATION PROCESSING SYSTEM**

**File Specification
3A12**

Version 7

March 23, 2012

0.1 3A12 - Monthly TMI Profiling

3A12, "Monthly TMI Profiling", produces global $0.5^{\circ} \times 0.5^{\circ}$ monthly gridded means using 2A12 data. Vertical hydrometeor profiles and surface rainfall means are computed. Various pixel counts are also reported. The PI is Joyce Chou. The granule size is one month. The following sections describe the structure and contents of the format.

Dimension definitions:

nlat	160	Number of 0.5° grid intervals of latitude from 40°N to 40°S .
nlon	720	Number of 0.5° grid intervals of longitude from 180°W to 180°E .
nlayer	28	Number of profiling layers. The top of each layer is 0.5, 1.0, 1.5, ..., 9.5, 10.0, 11.0, ..., 18.0 km. The layer tops are heights above the earth's surface.

Figure 1 shows the structure of this product. The text below describes the contents of objects in the structure, the C Structure Header File and the Fortran Structure Header File.

FileHeader (Metadata):

FileHeader contains general metadata. This group appears in all data products. See Metadata for TRMM Products for details.

InputFileNames (Metadata):

InputFileNames contains a list of input file names for this granule. See Metadata for TRMM Products for details.

InputAlgorithmVersions (Metadata):

InputAlgorithmVersions contains a list of input algorithm versions for this granule. See Metadata for TRMM Products for details.

InputGenerationDateTimes (Metadata):

InputGenerationDateTimes contains a list of input generation datetimes. See Metadata for TRMM Products for details.

FileInfo (Metadata):

FileInfo contains metadata used by the PPS I/O Toolkit (TKIO). This group appears in all data products. See Metadata for TRMM Products for details.

Grid (Grid)

GridHeader (Metadata):

GridHeader contains metadata defining the grids in the grid structure. See Metadata for TRMM Products for details.

surfacePrecipitation (4-byte float, array size: nlat x nlon):

The monthly mean of the instantaneous precipitation rate at the surface for each grid. Values range from 0 to 3000 mm/hr. Special values are defined as:

-9999.9 Missing value

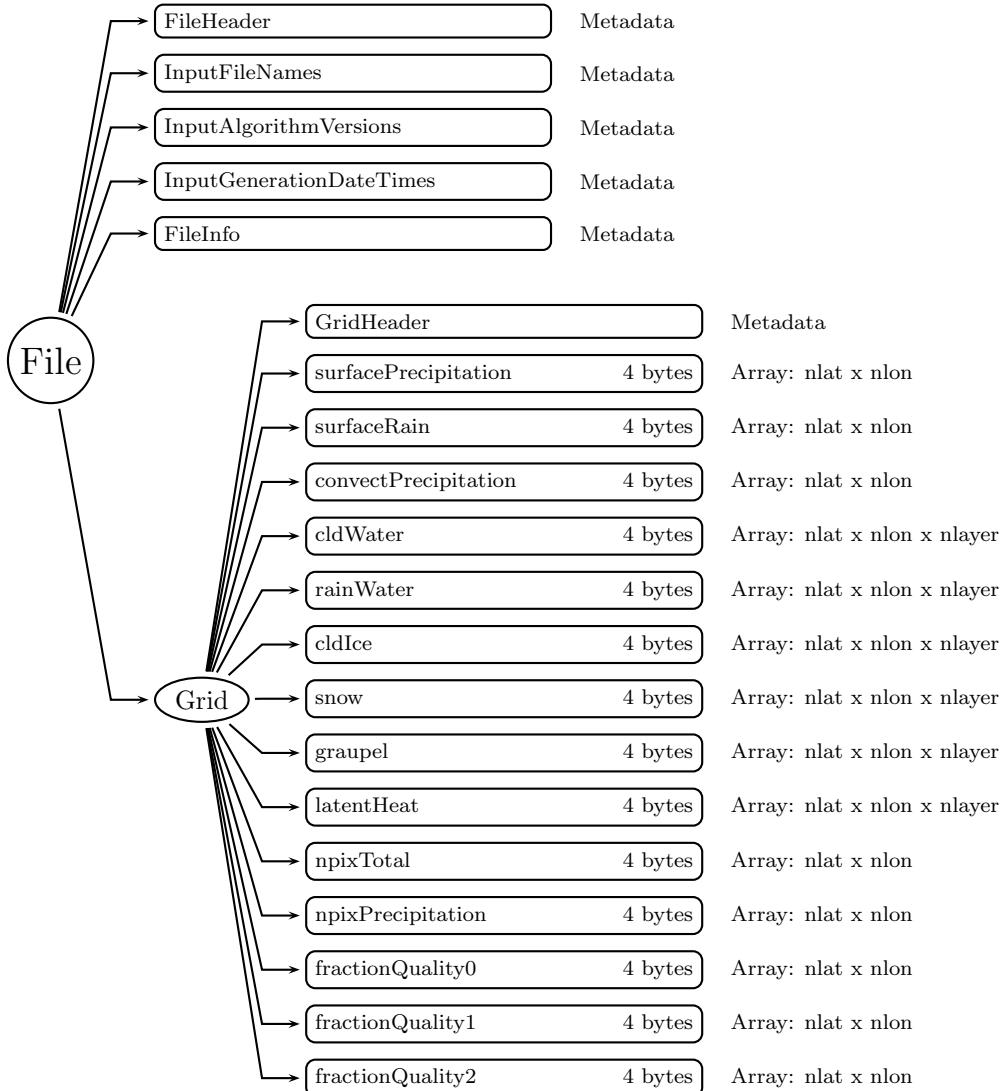


Figure 1: Data Format Structure for 3A12, Monthly TMI Profiling

surfaceRain (4-byte float, array size: nlat x nlon):

The monthly mean of the instantaneous rain rate (liquid portion of precipitation) at the surface for each grid. Values range from 0 to 3000 mm/hr. Special values are defined as:

-9999.9 Missing value

convectPrecipitation (4-byte float, array size: nlat x nlon):

The monthly mean of the instantaneous convective precipitation rate at the surface for each grid. Values range from 0 to 3000 mm/hr. Special values are defined as:

-9999.9 Missing value

cldWater (4-byte float, array size: nlat x nlon x nlayer):

The monthly mean of the cloud liquid water content for each grid at each vertical layer. Values range from 0 to 10 g/m³. Special values are defined as:

-9999.9 Missing value

rainWater (4-byte float, array size: nlat x nlon x nlayer):

The monthly mean of the rain water content for each grid at each vertical layer. Values range from 0 to 10 g/m³. Special values are defined as:

-9999.9 Missing value

cldIce (4-byte float, array size: nlat x nlon x nlayer):

The monthly mean of the cloud ice liquid water content for each grid at each vertical layer. Values range from 0 to 10 g/m³. Special values are defined as:

-9999.9 Missing value

snow (4-byte float, array size: nlat x nlon x nlayer):

The monthly mean of the snow liquid water content for each grid at each vertical layer. Values range from 0 to 10 g/m³. Special values are defined as:

-9999.9 Missing value

graupel (4-byte float, array size: nlat x nlon x nlayer):

The monthly mean of the graupel liquid water content for each grid at each vertical layer. Values range from 0 to 10 g/m³. Special values are defined as:

-9999.9 Missing value

latentHeat (4-byte float, array size: nlat x nlon x nlayer):

The monthly mean of the latent heating release for each grid at each vertical layer. Values range from -256 to 256 C/hr. Special values are defined as:

-9999.9 Missing value

npixTotal (4-byte integer, array size: nlat x nlon):

The monthly number of pixels with pixelStatus equal to zero for each grid. The major effect of the pixelStatus requirement is to remove sea ice. npixTotal is used to compute the monthly means described above. Values range from 0 to 10000. Special values are defined as:

-9999 Missing value

npixPrecipitation (4-byte integer, array size: nlat x nlon):

The monthly number of pixels with surfacePrecipitation greater than 0 for each grid. For ocean, a pixel is also required to have probabilityOfPrecip greater than 50 percent. Values

range from 0 to 10000. Special values are defined as:

-9999 Missing value

fractionQuality0 (4-byte float, array size: nlat x nlon):

The fraction of total pixels with qualityFlag equal to 0 (high quality) for each grid. Values range from 0 to 100 percent. Special values are defined as:

-9999.9 Missing value

fractionQuality1 (4-byte float, array size: nlat x nlon):

The fraction of total pixels with qualityFlag equal to 1 (medium quality) for each grid. Values range from 0 to 100 percent. Special values are defined as:

-9999.9 Missing value

fractionQuality2 (4-byte float, array size: nlat x nlon):

The fraction of total pixels with qualityFlag equal to 2 (low quality) for each grid. Values range from 0 to 100 percent. Special values are defined as:

-9999.9 Missing value

C Structure Header file:

```
#ifndef _TK_3A12_H_
#define _TK_3A12_H_

#ifndef _L3A12_GRID_
#define _L3A12_GRID_

typedef struct {
    float surfacePrecipitation[720][160];
    float surfaceRain[720][160];
    float convectPrecipitation[720][160];
    float cldWater[28][720][160];
    float rainWater[28][720][160];
    float cldIce[28][720][160];
    float snow[28][720][160];
    float graupel[28][720][160];
    float latentHeat[28][720][160];
    int npixTotal[720][160];
    int npixPrecipitation[720][160];
    float fractionQuality0[720][160];
    float fractionQuality1[720][160];
    float fractionQuality2[720][160];
} L3A12_GRID;

#endif
#endif
```

Fortran Structure Header file:

```
STRUCTURE /L3A12_GRID/
    REAL*4 surfacePrecipitation(160,720)
    REAL*4 surfaceRain(160,720)
    REAL*4 convectPrecipitation(160,720)
    REAL*4 cldWater(160,720,28)
    REAL*4 rainWater(160,720,28)
    REAL*4 cldIce(160,720,28)
    REAL*4 snow(160,720,28)
    REAL*4 graupel(160,720,28)
    REAL*4 latentHeat(160,720,28)
    INTEGER*4 npixTotal(160,720)
    INTEGER*4 npixPrecipitation(160,720)
    REAL*4 fractionQuality0(160,720)
    REAL*4 fractionQuality1(160,720)
    REAL*4 fractionQuality2(160,720)
END STRUCTURE
```